28990 Investigation of environmental Change pattern in Japan (Land Use Classification by Spectral Pattern Analysis- Preliminary Report)

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LAND USE CLASSIFIACTION BY SPECTRAL PATTERN ANALYSIS

- PRELMINARY REPORT -

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INTRODUCTION

The automated classification of land use has been based upon the statistic analysis with the use of training sets carefully setected in the training area. The clustering has been also another automated classification technique for land use.

However, these techniques do not use the patterns of spectral radiance curve obtained from the four spectrum bands, but the vectors of the four spectral values.

Land use classification by the spectral pattern analysis is being studied by the author. The results obtained from the preliminary study show that three typical patterns can be recognized which correspond to the three primary components of land use; water, vegetation and non-organic matter, which were defined in the previous report by the author.

TECHNIQUES

The spectral radiance curves are classified into 27 different patterns as shown in Fig. 1.

The input data for the pattern analysis are obtained from the preprocessing, by which the original digital values stored in the LANDSAT MSS CCT are converted into the spectral radiance.

The pattern analysis was tested for Chiba Area, in which the ground truth data are acquired from the national land use map of 1:50,000 with the grids of 100 meters x 100 meters, and the LANDSAT MSS digital data are geometrically corrected so as to correspond to the above mentioned grid.

Further detail classification for the data in the same pattern is now being discussed and tested. The principal component analysis will be one of the effective procedure which represents the trend of spectral radiance in the same pattern.

RESULT

Three major patterns were obtained which correspond to the three primary components, water, vegetation and non-organic matter, as shown in Table 1. The table shows that the land use is composed of the mixture of vegetation and non-organic matter. The more detail classification for land use will be given in the final report.

Table 1

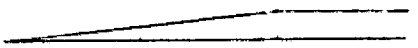
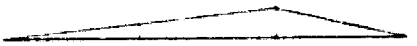
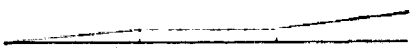
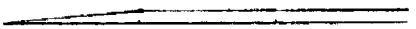
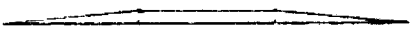
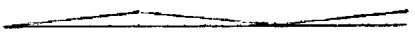
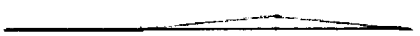
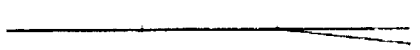
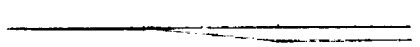
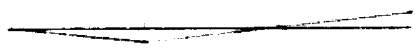
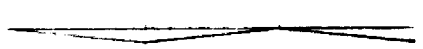
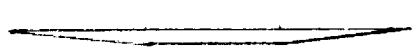
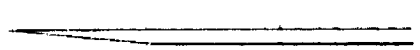
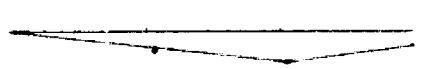
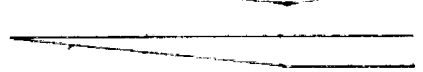
Pattern No.	Vegetation		Non-Organic Matter		Water		Total	
	No.	%	No.	%	No.	%	No.	%
19	12,220	75.6	3,886	24.0	50	0.4	16,156	
25	4,129	32.3	8,644	67.7	0	0.0	12,773	
27	0	0.0	207	1.7	12,223	98.3	12,430	
Total	16,349		12,737		12,273		41,359	

Remarks

(1) Non-organic matter includes bare soil, sand, rock, concrete, asphalt and so on, which are detected in the town, open space, construction, site, coast, industrial zone, partly residenrial zone, even agicultural field and so on.

(2) Vegetation is included in the forest, residensial area, agricultural field and so on.

CLASSIFICATION OF PATTERN

CASE	SYMBOL	PATTERN
1	IPT(1,1,1) ; (+,+,+)	
2	IPT(1,1,2) ; (+,+,0)	
3	IPT(1,1,3) ; (+,+,-)	
4	IPT(1,2,1) ; (+,0,+)	
5	IPT(1,2,2) ; (+,0,0)	
6	IPT(1,2,3) ; (+,0,-)	
7	IPT(1,3,1) ; (+,-,+)	
8	IPT(1,3,2) ; (+,-,0)	
9	IPT(1,3,3) ; (+,-,-)	
10	IPT(2,1,1) ; (0,+,+)	
11	IPT(2,1,2) ; (0,+,0)	
12	IPT(2,1,3) ; (0,+,-)	
13	IPT(2,2,1) ; (0,0,+)	
14	IPT(2,2,2) ; (0,0,0)	
15	IPT(2,2,3) ; (0,0,-)	
16	IPT(2,3,1) ; (0,-,+)	
17	IPT(2,3,2) ; (0,-,0)	
18	IPT(2,3,3) ; (0,-,-)	
19	IPT(3,1,1) ; (-,+,+)	
20	IPT(3,1,2) ; (-,+,0)	
21	IPT(3,1,3) ; (-,+,-)	
22	IPT(3,2,1) ; (-,0,+)	
23	IPT(3,2,2) ; (-,0,0)	
24	IPT(3,2,3) ; (-,0,-)	
25	IPT(3,3,1) ; (-,-,+)	
26	IPT(3,3,2) ; (-,-,0)	
27	IPT(3,3,3) ; (-,-,-)